

to me the explanation least open to objections. It might be conceived that the cells enlarged by imbibition, until at length the less distensible inner membrane gave way, and permitted an extravasation of a portion of the cell-contents between it and the outer membrane, its own continuity being in the meanwhile instantaneously restored by cohesion of the ruptured borders*. In this way a microscopic drop of the cell-contents would be lodged between the outer and inner membrane, and completely severed from the general cell-cavity. The peculiar modification spoken of as the "hooded" appearance might be due to imbibition of fluid between this microscopic drop and the outer envelope.

The chief difficulties in the way of this explanation arise out of the differences of nature which appear to exist between the projection and the general cell-contents of which it is supposed to be a detached portion. The projection refracts light much more highly than the cell-contents; it also is deeply dyed by magenta, whereas the cell-contents are only very feebly so.

In conclusion, it may be added that important advantages may be expected from the use of magenta in histological researches. Its inert chemical character, its prodigious tinting power, and its solubility in water eminently fit it for such a purpose. It will probably prove of especial use in bringing into sight objects which otherwise evade the visual organs from their absolute colourlessness and transparency, and from the equality of their refraction with the medium in which they exist.

ZOOLOGICAL SOCIETY.

June 24, 1862.—E. W. H. Holdsworth, Esq., F.L.S., in the Chair.

ON THE BREEDING OF THE NUTCRACKER (*NUCIFRAGA CARYOCATACTES*). BY ALFRED NEWTON, M.A., F.L.S., F.Z.S.

About six months ago (P. Z. S. 1861, pp. 396–7), I expressed a hope of being able before long to give the Society some more certain information with respect to the breeding of the Nutcracker (*Nucifraga caryocatactes*). In that I hope I have not been altogether disappointed.

The nest and young bird now exhibited (the latter still showing traces of its original downy clothing) have been received by me within the last few days from my excellent friend Herr Pastor P. W. Theobald of Copenhagen, to whom I think the Society will join with me in hearty congratulations on his success in obtaining these decisive facts in regard to the nidification of this mysterious bird, and whose zeal in the quest of zoological discovery fully deserves, in my opinion, all the praise that can be accorded to it.

* In the same manner as a soap-bubble when bisected, instead of collapsing, forms, in virtue of the adhesiveness and fluidity of its envelope, two new and perfect bubbles. That the cell-wall of the blood-disk possesses some such endowment seems highly probable. I have on several occasions witnessed, after adding magenta, the total extrusion of the nucleus, both in the frog and in the newt, without the least collapse of the corpuscles.

Believing, however, that the Pastor will himself publish fuller details of this interesting capture, I will only briefly recount the information with which he has supplied me.

It appears that, previously to the summer of 1860, a forester in the island of Bornholm had satisfied himself that the Nutcracker was in the habit of breeding there annually. He had seen it every month in the year from May to November inclusive; and this intelligence being communicated to Herr Theobald, that gentleman made an expedition to the island, but without finding the special object of his search—a nest of the bird. This present spring, however, the Pastor, accompanied by two of his friends, HH. Erichsen and Fischer, both keen oologists, visited Bornholm a second time; and one of their achievements I have now the pleasure of making known to you. Writing from that island, on the 30th of May last, Herr Theobald says:—

“Returning to the result of our ornithological expedition, I can tell you that, after many days’ inquiries, we succeeded in finding two nests of *Caryocatactes*, the young birds flying near them. As we presumed, we came too late for getting the eggs; but I think we have advanced a good deal, and after this discovery we dare be almost sure of receiving them next year. Our gentle and clever host, the forester Rosen, who now knows the time and manner of nidification of this bird, may be considered a guarantee for our hopes.

“We have thought it might be of interest to you to possess an undoubtedly genuine nest of *Caryocatactes*, and also a young bird in the first plumage; we therefore send you one nest and one skin. Both the nests are of the same size and construction. They were in fir-trees (*Pinus rubra*), not very private, but rather easy to find. It is likely that the young birds had left the nest perhaps eight days. None of them moved, except with difficulty, among the branches; and one of them fell on the ground. The old birds cried, but only sometimes, with an anxious voice that was not unlike a Magpie’s, and then all was silent again. In the neighbourhood of the nest, where the birds had been previously observed, we found on the rocky ground a good number of freshly cracked hazel-nuts; and as no nut-trees grow there, the birds must fetch them from a distance of an English mile at least. We are inclined to think that they collect them in autumn and secure them in a private spot; and perhaps it is on this account also that the bird, whose economy is very hidden, is seldom to be seen in the breeding-time.

“As I have already mentioned, the nest is not of the most difficult class to find. It is not built on the top [of the tree], but close to the stem, about 25 or 30 feet high. The bird is an early breeder, but can scarcely have eggs before the beginning of April.

“Now you have the nest wherein the young birds were lately hatched, and a young bird in its first plumage. Next year we hope to send you very well authenticated eggs.”

I have only to conclude by mentioning that the nest, as will be seen on examination, is of large size, some five or six inches in thickness, with an outside diameter of about a foot, and a shallow depres-

sion of six inches across ; but the cup was probably a good deal deeper before its brim was subjected to the weight of the young birds. It is composed outwardly of sticks and twigs, among which I recognize those of the larch, spruce, and birch. These latter show the period at which it must have been built, as the buds, though enlarged, had not burst. It has a thick lining of grass, which appears to have been plucked while growing. The very small bits of moss and lichen do not seem to have been intentionally added, but to have adhered to the other materials. The down with which the nestling has been covered, and of which traces may be observed on a few of the back-feathers, is of a dark-brownish grey, as is usual among the *Corvidæ*. The first plumage much resembles that of the adult, being, however, duller in colour and with the white tear-like spots less conspicuous ; but the quill-feathers of the wings and tail are not so entirely destitute of metallic reflexions as some authors lead one to imagine.

Whether the Nutcracker builds the whole structure for itself, or only furnishes the forsaken nest of some other animal, I do not know. This and other particulars we shall probably soon learn from Pastor Theobald himself ; and I need scarcely say I look forward with the greatest interest to the clearing up of our doubts as to what its eggs are really like.

ON SOME POINTS RELATING TO THE ANATOMY OF THE HUMMING-BIRD (*TROCHILUS COLUBRIS*). BY EDWARDS CRISP, M.D., F.Z.S., ETC.

The recent dissection of the above-named bird has induced me to place an account of some parts of its anatomy before the Society, believing that the communication will not be devoid of interest.

I am indebted to Mr. Gould for the Humming-bird, which he captured in America, and brought alive to this country ; but it lived only a few days after its arrival.

It had been preserved in spirits for some time before I examined it, and therefore the weight may not have been exactly the same when first captured, but I believe that the difference would be very slight. I have, in the accompanying drawing, depicted the bird with and without its skin. I have also represented the skeleton and all the viscera by measurement.

The bird (a female) weighed 61 grains ; its length from beak to tail 4 inches, the bill being three-fourths of an inch, the tail 1 inch ; from the extremity of each wing, when extended, $4\frac{1}{4}$ inches. Tail-feathers ten ; wing-feathers in all sixteen, the first the longest.

On removing the skin, the bird, as represented in the drawing, had a very plump, solid appearance, the pectoral muscles being of very large size : they weighed 12 grains, being nearly one-fifth the weight of the bird. The extremities of the os hyoides, as in the Woodpeckers, reached the anterior part of the head. The thoracic and abdominal viscera, when viewed *in situ*, presented nothing abnormal either in form or position. I failed to discover a gall-bladder.

The brain weighed 3 grains, forming a large proportional amount to the body ($\frac{1}{10}$); the alimentary canal measured $3\frac{1}{2}$ inches.

The crop membranous and capacious; the gizzard moderately thick, with a soft cuticular lining. A small elevated spot was observed (under the microscope) on the surface of the rectum, which probably was the rudimentary appendix.

The trachea consisted of about sixty rings, and the left bronchus of forty—the latter being nearly the length of the trachea. The ovary very small. The os hyoides long and very muscular, extending, as before stated, to the space between the orbits. The tongue from the base of the os hyoides fourteen lines in length, the bifid portion being eight lines. This latter part appeared to be composed of two elastic cylinders having a membranous web on their inner sides; these webs towards their extremities, as seen in the drawing, present a shreddy, torn appearance, the torn portions being of a triangular shape, their bases towards the cylinders. These cylinders were not hollow, but composed of a solid cartilaginous material. The eyes measured two lines in diameter, and weighed about one grain.

Skeleton.—The enormous depth of the sternum in this little bird at once excites attention. The sternum is of a triangular shape, its anterior and deepest portion measuring four lines, its length $6\frac{1}{2}$ lines: the cervical vertebræ twelve, the coccygeal five, ribs seven; flat, broad, and thin. The depth of the sternum and the great proportional size of the pectoral muscles probably exceed those of any other bird, judging from the sterna of several hundred species of birds that I have inspected. The humerus very short, one line; carpus two lines; metacarpus two lines; phalanges $3\frac{1}{2}$ lines; femur two lines; tibia four lines; tarsus $1\frac{1}{2}$ line; longest toe three lines; the claws curved and sharp. *The bones of this bird did not contain air.*

Remarks.—I have been somewhat minute in the description of the measurements of the skeleton, because it is only by comparison with the skeletons of other birds that any practical and useful results can be arrived at. The shortness of the humerus is one remarkable feature; and in this respect there is a great resemblance to the same bone in the Swifts (*Cypselinæ*). It is curious that this bone in our common Swift (*Cypselus apus*), although of very small size, contains air. By some it will be thought singular that the very swift-flying bird the Humming-bird should have no air in its bones; but when we consider, as I have stated in my papers upon this subject in our 'Proceedings' (1857, pp. 9 and 215), that the bones of two of our swiftest-flying birds—the Swallow and Martin—contain no air, the absence of it in the bones of this bird will appear less remarkable. In the first paper alluded to (p. 12), I have stated that Professor Owen, in his 'Lectures on Comparative Anatomy,' vol. ii. p. 34, remarks that the Swifts and Humming-birds are said "to have air in every bone of the skeleton, down to the phalanges of the claws."

I repeat this because several physiologists and lecturers on comparative anatomy still adhere to the old doctrine of the presence of air in the bones of all birds; and on asking a celebrated physiolo-

gist whether he believed that the bones of birds contained air; his reply was, "Has a bird a brain?"

Professor Owen, in the Lectures on Birds that he is now delivering at the Government School of Mines, as reported in 'The Medical Times and Gazette,' May 24, 1862, p. 537, says,—“In the swift Humming-birds and in other birds of flight, the air permeates the interior of every bone of the skeleton.”

Brisson and Lesson, as quoted by Sir W. Jardine, state that “the tongue of the Humming-bird is composed of two muscular tubes, joined together for the greater part of their length, towards the tip broadened or swelling, and, according to Lesson, terminated in a spoon-like point on the upper surface. They assist in retaining the different substances, which are immediately conveyed to the opening of the œsophagus by the contractility of the tubes.” Sir W. Jardine says that he has “confirmed this statement, as far as the examination of the moistened parts would allow.” He adds, “Our own examination of the tongue of the *Trochilus moschitus*, relaxed with warm water, gave the appearance of a fimbriated opening at the tip, having the exterior margin of each fork set with recurved, sharp-pointed, pliable spines, as if to assist its viscosity in securing any substance seized by them.”

It is possible that in the different species of *Trochilidæ* the tongue, like the beak and tail-feathers, may differ somewhat; but I believe it will be found that the cylinders are not hollow, and that the recurved spines spoken of by Sir W. Jardine are shreds of the membranous part of the tongue detached by maceration. The somewhat feather-like tongue of these birds is probably used chiefly for dipping into the nectar, and for detaching the small insects upon the flowers, the rapid motion of the organ enabling the bird to obtain a large supply of nourishment in a short time.

The examination of recent specimens will be necessary to decide the question as to the tubular character of the tongue; but there is one thing tolerably certain, viz. that the food of these birds is chiefly insects, and does not consist of the nectar of flowers only, as was formerly supposed.

Nov. 11, 1862.—Professor Huxley, F.R.S., V.P., in the Chair.

OBSERVATIONS ON THE LIVING AYE-AYE IN THE ZOOLOGICAL GARDENS. BY A. D. BARTLETT.

The subject of the following remarks is a fine adult female of the Aye-aye (*Chiromys madagascariensis*), which arrived in this country on the 12th of August last. On the voyage, this animal produced a young one, which lived about ten days. On arriving here she was in poor condition and very feeble; she soon, however, began to feed freely, and has now considerable strength, as is shown by the timber destroyed in the cage in which she is kept.

This animal is much blacker, and appears larger, than the male of this species now in the British Museum; the long hairs on the back of

the neck, extending to the lower part of the body, have white points; these white points are thickest above, and become less numerous towards the limbs and tail, which appear quite black; the hairs of the tail, however, are white or grey at the roots (this can only be observed by separating them); the chin and throat are dirty white, which colour extends over the chest; the short hairs on the face are a mixture of dirty grey and white; the long hairs are black; the eyes light brown, surrounded by dark-coloured hairs; the nose and muzzle are of a dirty flesh-colour; the lips pink; the ears, shining black, and naked, but thickly studded with small protuberances; the feet and toes are sooty black, with the under surface and claws lighter, inclining to flesh-colour. The situation of the mammæ is remarkable: they are two in number, and placed at the lowest part of the abdomen (the animal differing in this respect entirely from the Lemurs and Bats, the teats of which are on the breast).

The Aye-aye sleeps during the day; and the body is then generally curved round and lying on its side, the tail is spread out and flattened over it, so that the head and body of the animal are almost entirely covered by the tail.

It is only at night that the Aye-aye exhibits any activity. I hear her crawling about and gnawing the timber when, to me, all is perfectly dark; and I have been surprised to find that upon the introduction of a light, directed to the face of the animal, she does not exhibit any signs of uneasiness, but stretches out her arm and tries to touch the lamp with her long fingers. She frequently hangs by her hind legs, and in this position cleans and combs out her large tail, using the slender hook-like third finger with great rapidity, reminding one strongly of the movements of the large Bats (*Pteropus*). This skeleton-like finger is used with great address in cleaning her face and picking the corners of the eyes, nose, mouth, ears, and other parts of her body; during these operations the other fingers are frequently partially closed.

In feeding, the left hand only is used, although she has the full use of her right one. The mode of taking her food requires careful attention, in consequence of the very rapid movement of the hand during the process. The fourth finger (which is the longest and largest) is thrust forward into the food, the slender third finger is raised upwards and backwards above the rest, while the first finger or thumb is lowered so as to be seen below and behind the chin; in this position the hand is drawn backwards and forwards rapidly, the inner side of the fourth finger passing between the lips, the head of the animal being held sideways, thus depositing the food in the mouth at each movement; the tongue, jaws, and lips are kept in full motion all the time. Sometimes the animal will advance towards and lap from the dish like a cat, but this is unusual. I have never heard her utter any cry, or produce any vocal sound, during the many hours at night in which I have watched her habits, nor has she appeared shy or angry at my presence.

With reference to food, this creature exhibits no inclination to take any kind of insects, but feeds freely on a mixture of *milk, honey, eggs,*

and any *thick, sweet, glutinous fluid*, rejecting meal-worms, grasshoppers, the larvæ of wasps, and all similar objects. Consequently I am inclined to think that this animal is not insectivorous. Its large and powerful teeth lead me to infer that it may possibly wound trees, and cause them to discharge their juices into the cavity made by its teeth; and that upon this fluid it probably feeds. This appears to me the more likely, as I observe that our specimen returns frequently to the same spot on the tree which she had previously injured. I am also strengthened in my opinion by noticing the little attention paid by the animal to its food. It does not watch or look after it; for I have on several occasions removed the vessel containing its food during the time the animal was feeding, and the creature continued to thrust its hand forward, as before, upon the same spot—though after a while, finding no more food, she discontinued, and moved off to search for more elsewhere. This apparently stupid act is so unlike the habits of an animal intended to capture or feed on living creatures that I am inclined to believe that the Aye-aye feeds upon inanimate substances. I have frequently seen it eat a portion of the bark and wood after taking a quantity of the fluid food.

The excrement of this animal much resembles the dung of small rabbits, being in separate nearly round balls.

ON A NEW BIRD FROM THE ISLAND OF MADAGASCAR.

BY DR. G. HARTLAUB, FOR. MEMB.

CUCULUS ROCHII, sp. nov. *Supra ardesiacus; gutture pallidius cinereo; pectore et abdomine in fundo albo-flavicantibus, fasciis rarioribus angustis nigricantibus; subalaribus flavescenti-albidis, tenuissime ardesiaco fasciolatis; subcaudalibus ochraceis, maculis nonnullis nigris; rectricibus nigris, maculis rarioribus minutis albis prope scapam notatis, omnium apicibus albis; ala extus unicolore, nigricante, remigum pogoniis internis albo fasciatis vel postice transversim maculatis; maxilla nigricante; mandibula flava, apice obscura; pedibus flavis.*

Long. 10–11^l; rostr. a fr. 8^l; al. 5^l 11^l; caud. 5^l 7–8^l.

Syn. "*Cuculus canorus*, L., common at Madagascar," Desjardins, P. Z. S. 1832, p. 111. *C. tenuirostris*, Jules Verreaux, MS. (*olim*).

Nearly allied to certain Indian species, but in all probability distinct. In an old MS. of my friend Jules Verreaux I find an accurate description of this species, under the often misused name of *Cuculus tenuirostris*.

Named after Dr. S. Roch, who accompanied the mission sent last year by the Government of Mauritius to that of Madagascar.

Nov. 25, 1862.—E. W. H. Holdsworth, Esq., F.Z.S., in the Chair.

NOTICE OF TWO NEW SPECIES OF BATAGUR IN THE COLLECTION OF THE BRITISH MUSEUM. BY DR. J. E. GRAY.

Dr. Günther, who is re-examining the Indian Tortoises in the British Museum, has drawn my attention to two young specimens of

the genus *Batagur*, which he believes to be different from those that I have hitherto described; and as there appears every reason to believe that they indicate species that have not hitherto been recorded in the Catalogue, I shall proceed to describe them provisionally until we receive more adult representatives of them. They both belong to the subgenus called *Kachuga*, as defined in my 'Catalogue of Shield Reptiles in the British Museum' (p. 35).

BATAGUR PICTA.

Pale grey-brown, with three interrupted dark brown streaks on the back, and a more or less triangular dark brown spot on the front margin of the marginal shields; beneath uniform pale yellow. Nuchal shield none. The first vertebral plate oblong, four-sided, rather longer than broad; the second, third, and fourth six-sided, second and third as long as broad, the fourth rather longer than broad. The margin entire, bent up behind. The pectoral and anal plate as long as broad. Head (when dry) pale olive, blackish on each side.

Hab. Borneo, Sarawak (*Wallace*).

Length 11, width $8\frac{1}{2}$ inches. Not full-grown, and with large intercostal spaces on the sides, showing that this species grows to a much larger size.

BATAGUR ELLIOTI.

Young state. Pale grey-brown, one-coloured when dry; the hinder margin strongly and acutely serrated. Nuchal shield broad, short. Second, third, and fourth vertebral shields strongly keeled, and ending in an acute prominence; the first square, rather broader than long; second and third six-sided, broader than long; fourth six-sided, longer than broad. Underside uniform pale yellow. The gular plate triangular; the pectoral and anal shorter than broad. The head dusky brown; temple and beak yellow, with a blackish streak from the nostril to the orbit, and continued behind from the orbit over the tympanum.

Hab. Southern India, River Kistna (*Walter Elliot*).

The specimen is very young, with very large narrow intercostal spaces, showing that it grows to a considerable size. It is known from all the other species by its sharp dentated margin. This character may be obliterated in the adult specimens; but I am not aware that it occurs in any other young *Batagur*, and we have most of the described species in a young state. The specimen here described was procured from Mr. Warwick, the dealer, without any habitat. But Dr. Günther has shown me a drawing, which has been sent to him by my excellent friend Mr. Walter Elliot, of Wolfelee, with the above habitat attached to it, which is so like the specimen described as almost to lead to the supposition that it was made from the same individual. From the drawing we not only learn the habitat, but also that the colour of the living animal is very like that of the dry specimen.